Introduction of

HES-3106

FTTX Gigabit Ethernet Management Switch

July 2012

Agenda

- Target Segment and Product Position
- HES-3106 Series Model list
- Product Overview
- Key Features
- Key Selling Point

Target Segment and Product Position

Market Segment

Residential CPE switch for FTTX market which requires practical management features demand.

Product Position

1.L2 Gigabit FTTH CPE switch
2.Compact size with Dual Rate fiber port uplink + 5 x TP for LAN
3.Support Telnet Cisco like CLI / SNMP management interface
4.Text-Based config with DHCP auto-provision
5.Optional optical CATV RF receiver
6.Optional fiber cable tray management

HES-3106 series Model list

1000Mbps Fiber Uplink series

Model	TP	F/O	CATV-RF
HES-3106FX/W2X	5 x 10/100/1000	1 x 1000	
HES-3106W2X-RF	5 x 10/100/1000	1 x 1000	V

100/1000Mbps Dual-Rate Uplink series

Model	TP	F/O	CATV-RF
HES-3106SFP	5 x 10/100/1000	SFP slot x 1	
HES-3106SFP-RF	5 x 10/100/1000	SFP slot x 1	V
HES-3106W2X-DR	5 x 10/100/1000	1 x 100/1000	
HES-3106W2X-DR-RF	5 x 10/100/1000	1 x 100/1000	V

SFP model support 100Mbps , 1000Mbps or 100/1000Mbps SFP module

TP version

Model	TP	F/O	CATV-RF
HES-3106TP	6 x 10/100/1000		

Product Overview – Front

LED Indicators
Power, Status, Port Link/Act

Dimension:
180 x 130 x 30mm (WxDxH)

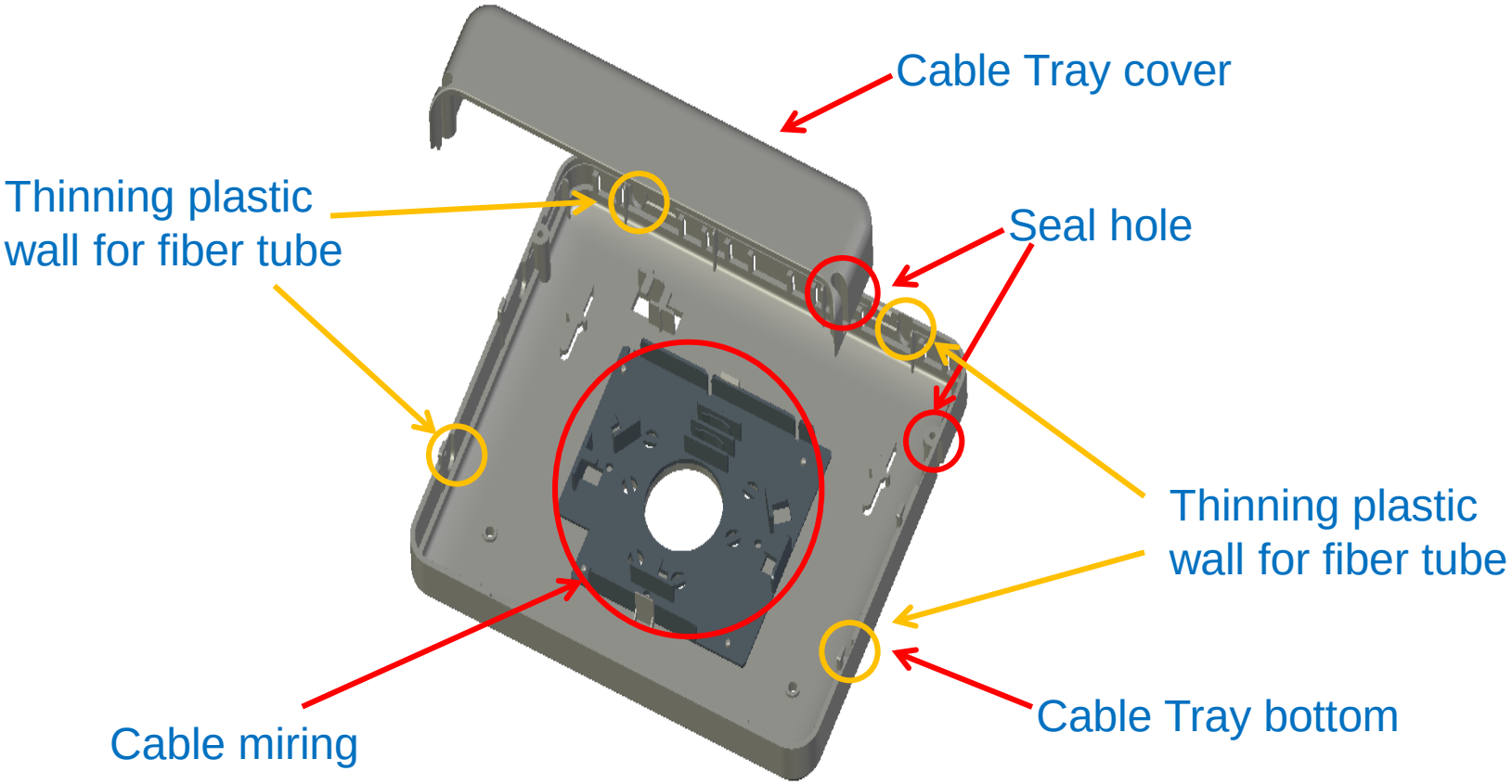
12VDC input

Smart Lighting Control
ON: Normal mode
OFF: Sleeping mode (Only Power LED active)

5 x 10/100/1000Base-T Port

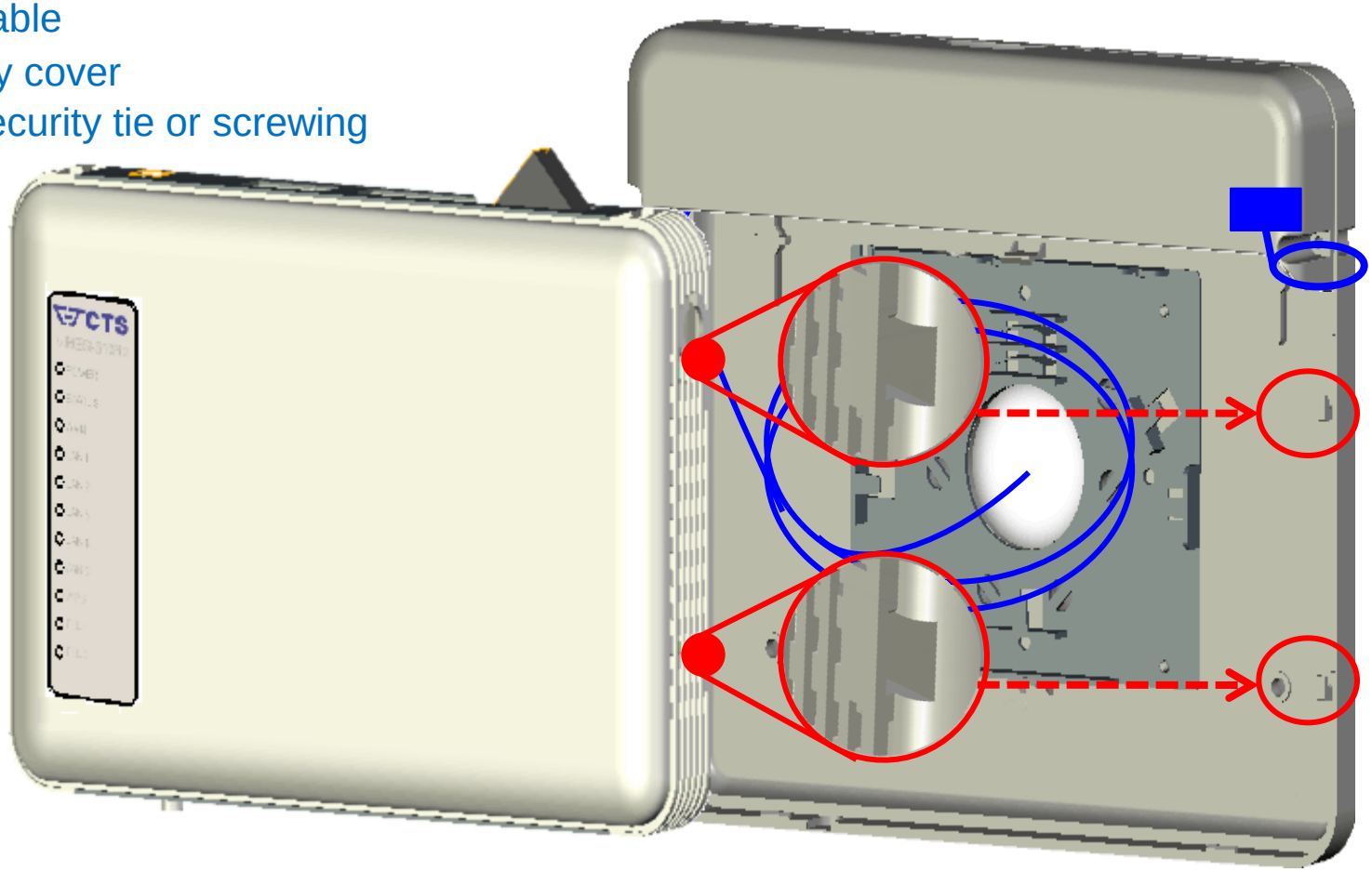
CATV coaxial output
(HES-3106-RF series only)

Product Overview – Option Fiber Management



Product Overview – HES-3106 Fiber Management Installation

1.Install fiber cable
2. Align fixating holes with holders on the cable tray
3.Combine Active device and Cable tray Unit
4.Connect fiber cable
5.Close Cable tray cover
6. Seal hole for security tie or screwing



Product Overview – HES-3106 + Fiber Cable Tray

Dimension:
180 x 180 x 42mm (WxDxH)

Key Features

- **Service port**
  - Ethernet interface:
    - LAN: 5 x 10/100/1000Base-T
    - Uplink: 1 x 1000Base-X or 100/1000Base-X or 10/100/1000Base-T
  - CATV interface (HES-3106-RF serial only)
    - 1 x Optical input + 1 x coaxial output
- **HW Features**
  - Store and Forward Switching Mechanism
  - Auto-Negotiation in TP port
  - Auto Crossover for MDI/MDIX in TP port
  - 2K MAC address
  - 9K Jumbo frame
  - LED on/off control
- **L2 Features**
  - IGMP Snooping V1/V2
  - 802.1q VLAN tag
  - Q-in-Q Double tag
  - Loop Detection
  - Port Isolation
  - 802.1p Priority
  - QoS with 4 Queues / Classification based on TOS , 802.1q
  - Bandwidth control
- **Management**
  - WEB Management
  - SNMP V1/V2c
  - CLI
  - Text based config file.
  - Storm Control
  - FTP/TFTP Firmware Upgrade
  - DHCP Auto-Provision
  - SNMP power down trap
  - Config DHCP Vendor class ID
  - SNTP
  - TR-069*
- **Dimension**

HES-3106 Main unit : 180 x 130 x 30mm (WxDxH)
HES-3106 + Fiber management: 180 x 180 x 42mm (WxDxH)

Key Selling Points of HES-3106

- Provide DHCP auto provision + CLI Text based Config file to fulfill the deployment requirement and reduce the OPEX of device maintenance for service providers or operators.

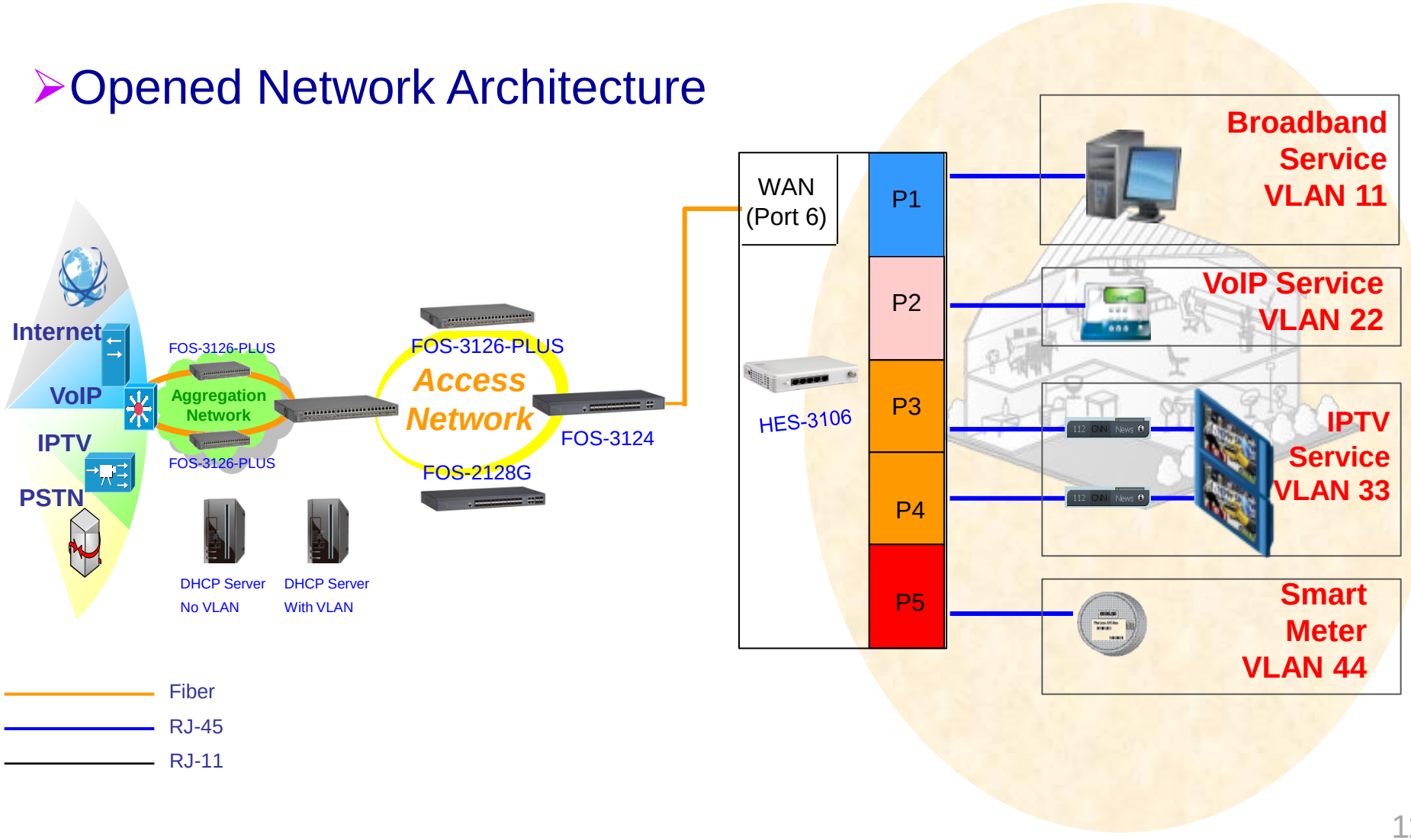
- HES-3106 delivers popular SNMP trap message to rapidly identify network fault due to power outage and reduce truck rolls to save OPEX for service providers.

- Optional choice for fiber cable tray. Normally in FTTH installation, the fiber is intentionally left longer than it actually needs. The extra fiber cable can be put inside the cable tray to have extra protection for the sensitive fiber.

- With 100/1000Mbps Dual Rate 100/1000Mbps Auto-Sensing function, HES-3106 can automatically adjust the speed of fiber transceiver. Therefore, the operator does not need to configure CPE fiber port speed when the it switches to 1000Mbps or 100Mbps.

Application Services Scenario

Opened Network Architecture



VLAN

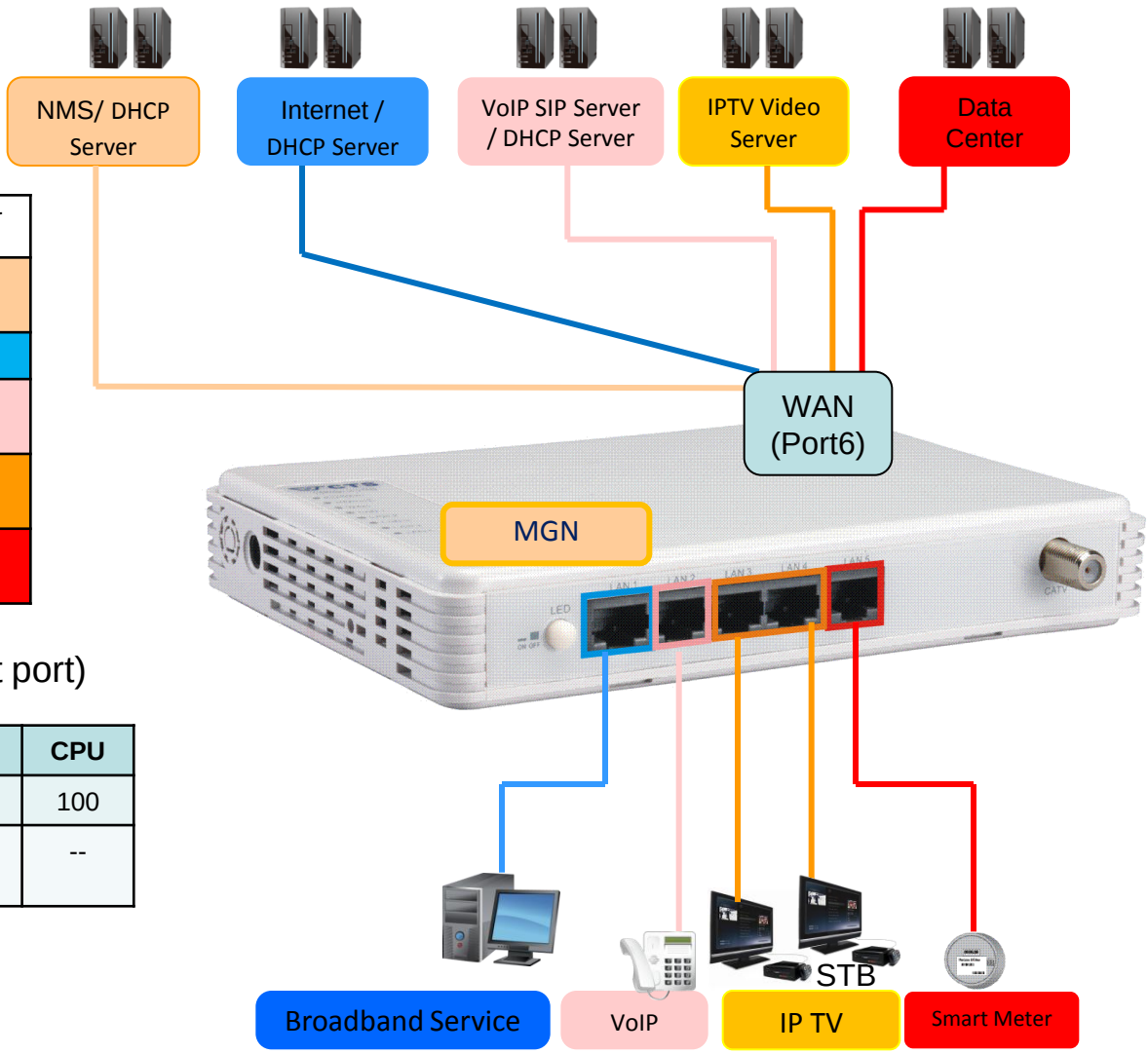
VLAN Table

Application	VLAN Name	VLAN VID	VLAN Member Port
NMS	Management VLAN	100	CPU, 6
Broadband	Internet VLAN	11	1
VoIP	Telephony VLAN	22	2
IPTV	Multicast VLAN	33	3,4
Smart meter	Smart Meter VLAN	44	5

VLAN Port Setting (Port 6 Management port)

Port	1	2	3	4	5	WAN 6	CPU
PVID	11	22	33		44	1	100
Port type	Access Port					Trunk Port	--

Port type:
A →VLAN Access port
T →VLAN Trunk Port

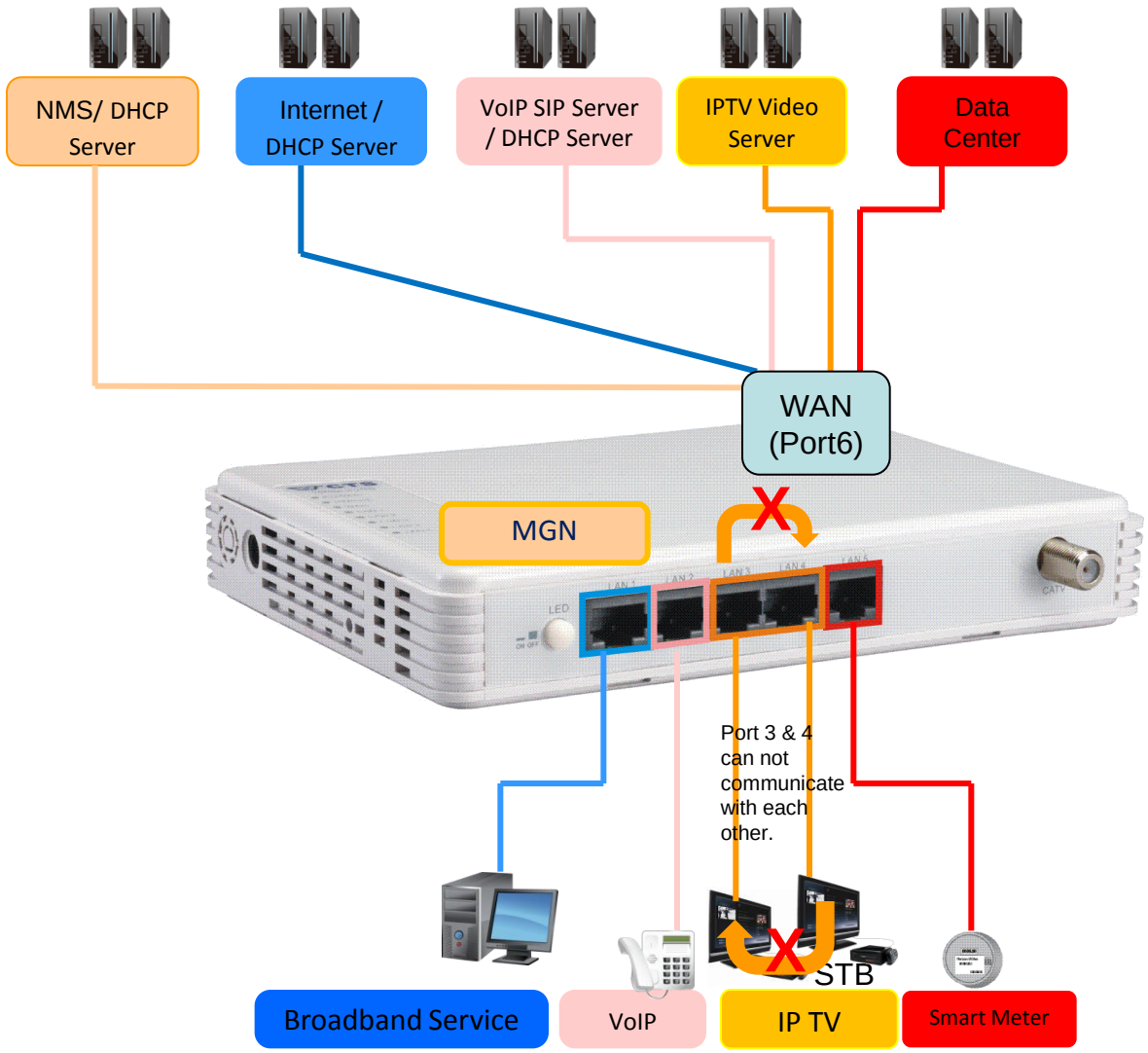


Port Isolation

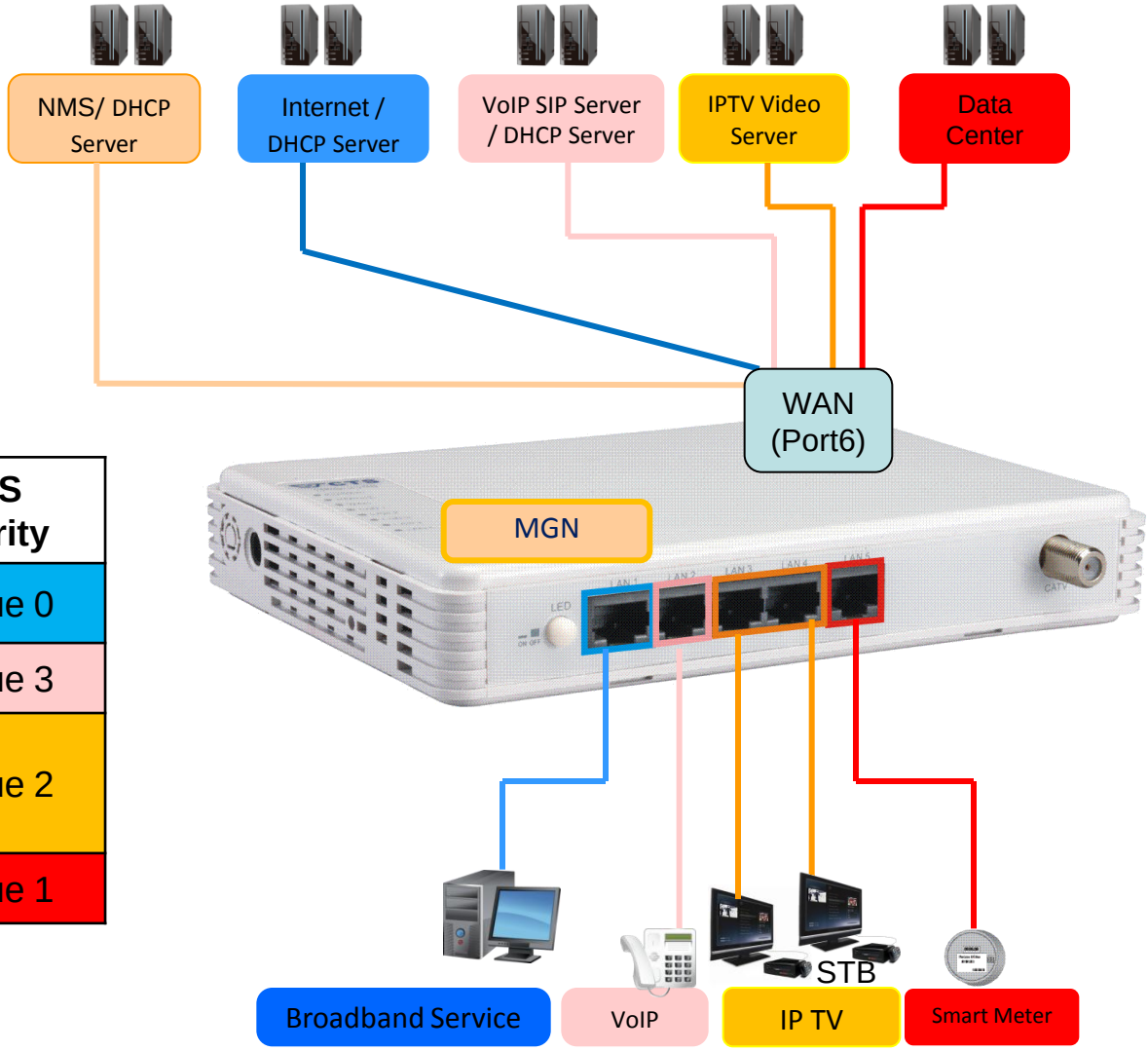
If Port Isolation is enabled, each port can only forward packets to WAN (Port 6). In other words, each LAN port can not communicate with each other.

Port Isolation Forwarding Table:

Port	1	2	3	4	5	WAN 6
1	✓					✓
2		✓				✓
3			✓			✓
4				✓		✓
5					✓	✓
WAN 6	✓	✓	✓	✓	✓	✓



Quality of Service (QoS)



QoS Priority by Switch Port:

Port	Application	QoS Priority
1	Internet	Queue 0
2	VoIP	Queue 3
3	IPTV	Queue 2
4		
5	Smart Meter	Queue 1

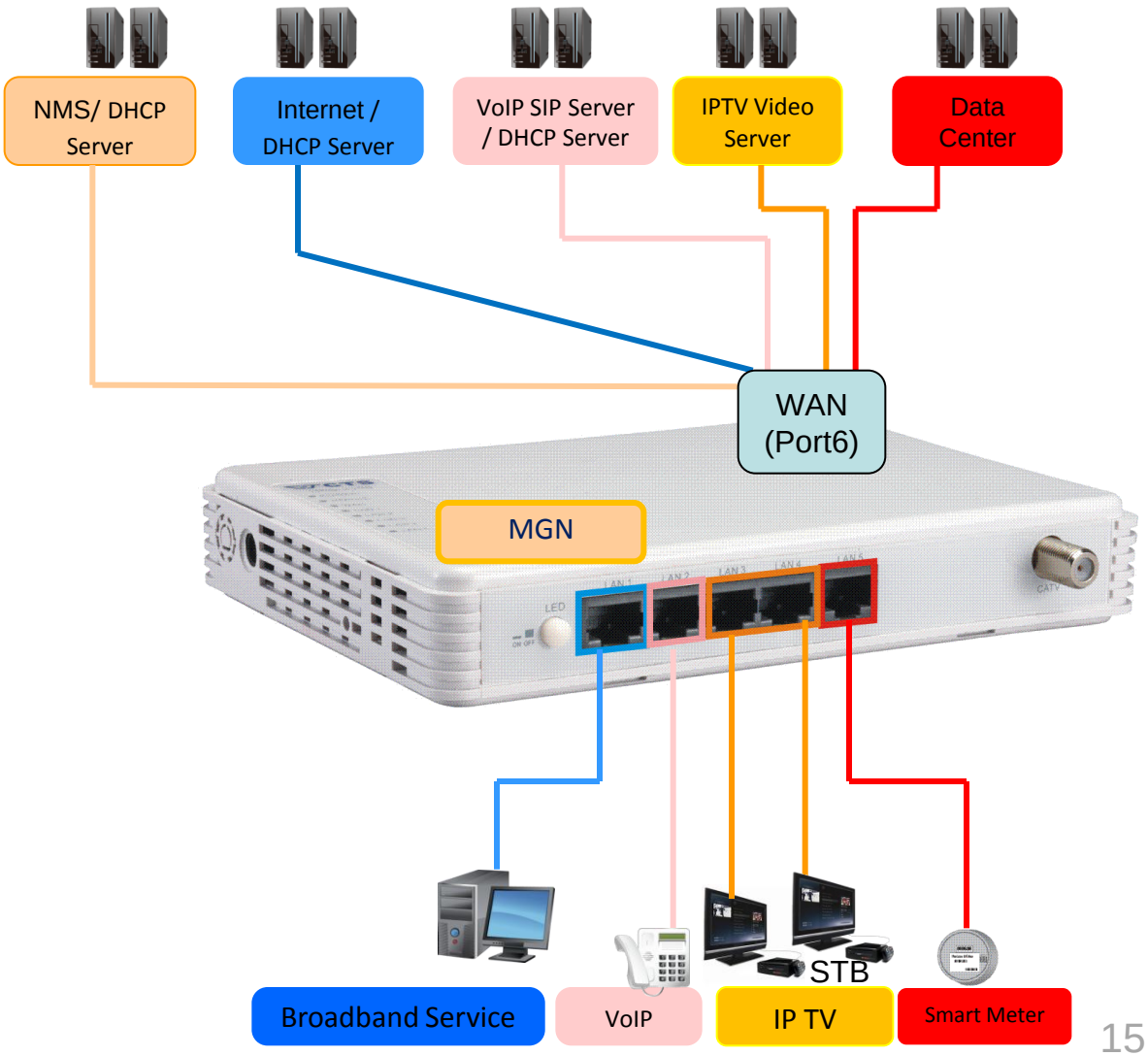
Rate Limit & Traffic Storm Control

Rate Limit

Port	Application	Egress Rate Limit (kbps)
1	Internet	10000kbps (10Mbps)
2	VoIP	No limit
3	IPTV	No limit
4	IPTV	No limit
5	Smart Meter	No limit
WAN 6	Uplink	100000kbps (100Mbps)

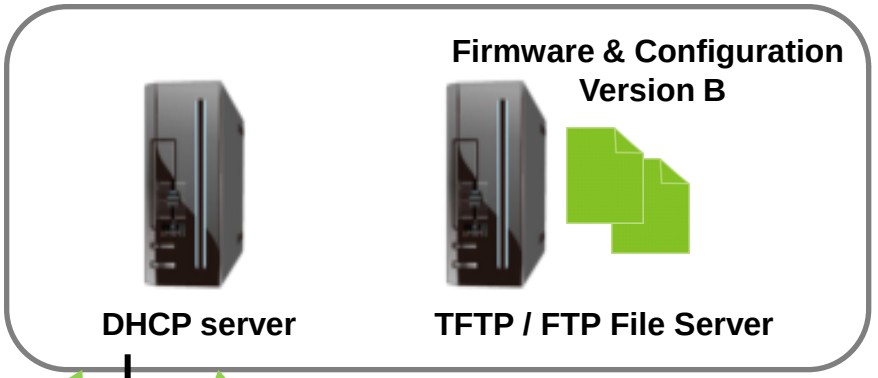
Storm Control Rate

Broadcast Rate Port 1~9 256Kbps
Unknown unicast no limit
Unknown Multicast no limit
Multicast no limit



DHCP Auto-Provisioning

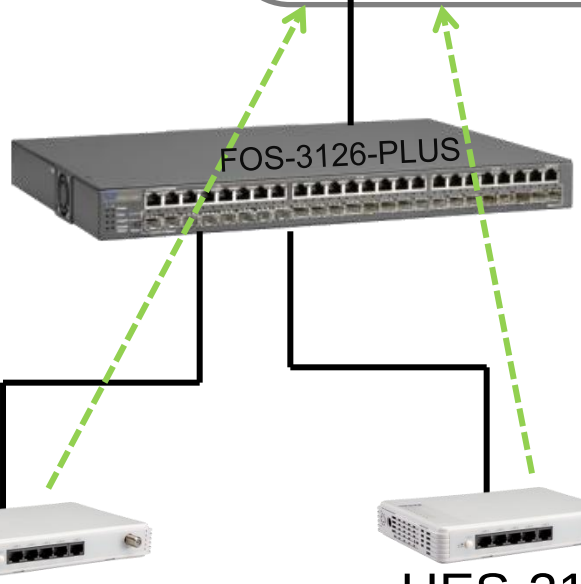
DHCP auto-provisioning allows the CPE Switch to automatically download the newest config and F/W image file from TFTP/FTP server when requesting IP address from DHCP server .



❶ "HES-3106 A" boots up or when DHCP renews IP address, it will get config string.

❷ If config on "HES-3106 A" is different from the one stored in the File server, it requests File server to download the newest config.

❸ Config is downloaded to "HES-3106 A", then it reboots with new config.



❶ "HES-3106 B" boots up or when DHCP renews IP address, it will get config string.

❷ If config on the server is the same as the one in HES-3106, HES-3106 boots up normally.

HES-3106 A

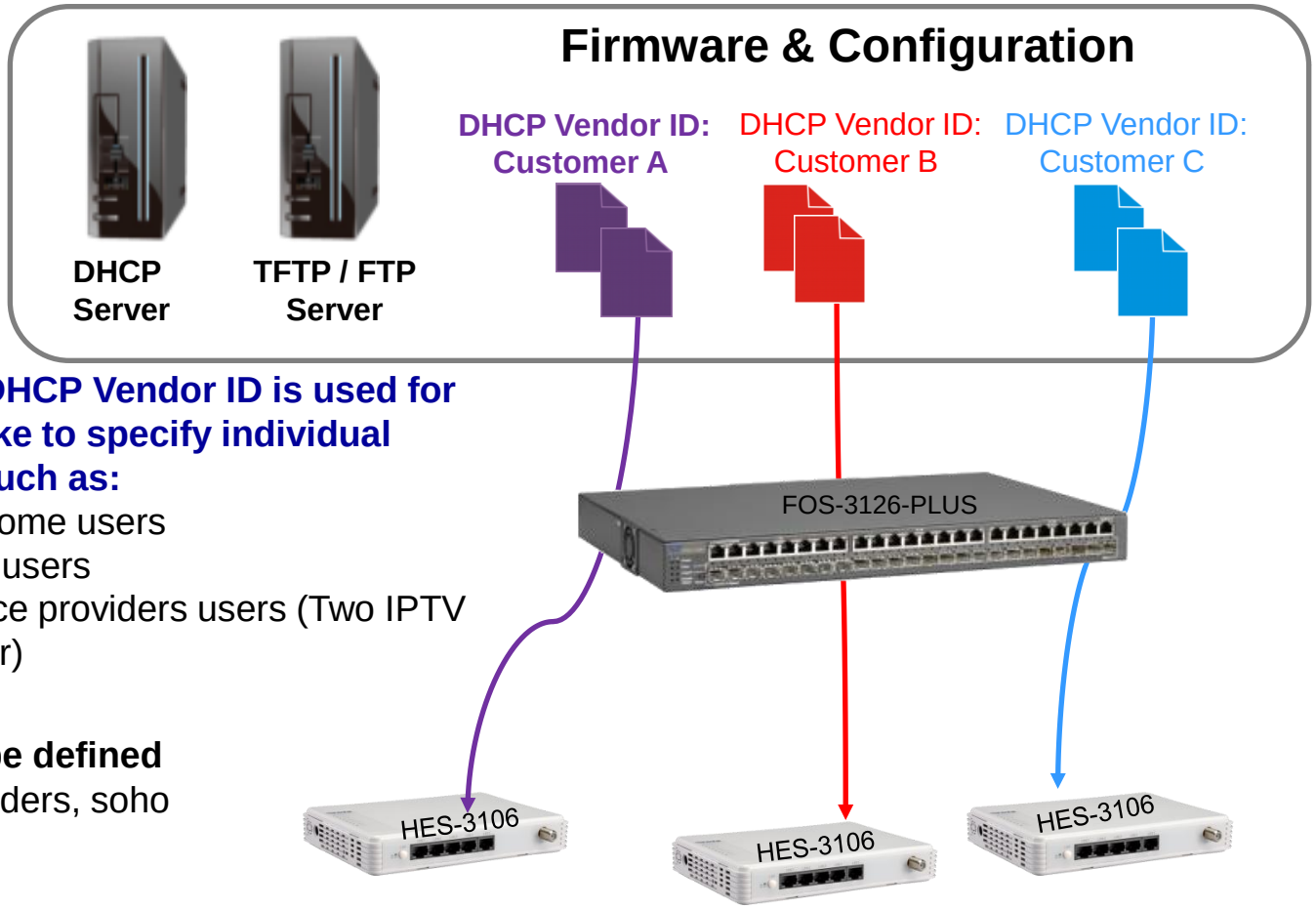
With Older config and Firmware

Firmware Version B
Configuration Version B

HES-3106 B

Firmware & Configuration Version B

User-Defined DHCP Vendor ID



Purpose: User-defined DHCP Vendor ID is used for customers who would like to specify individual configurations. Users such as:

- Advanced SOHO home users
- Business company users
- To have multi-service providers users (Two IPTV service provider user)

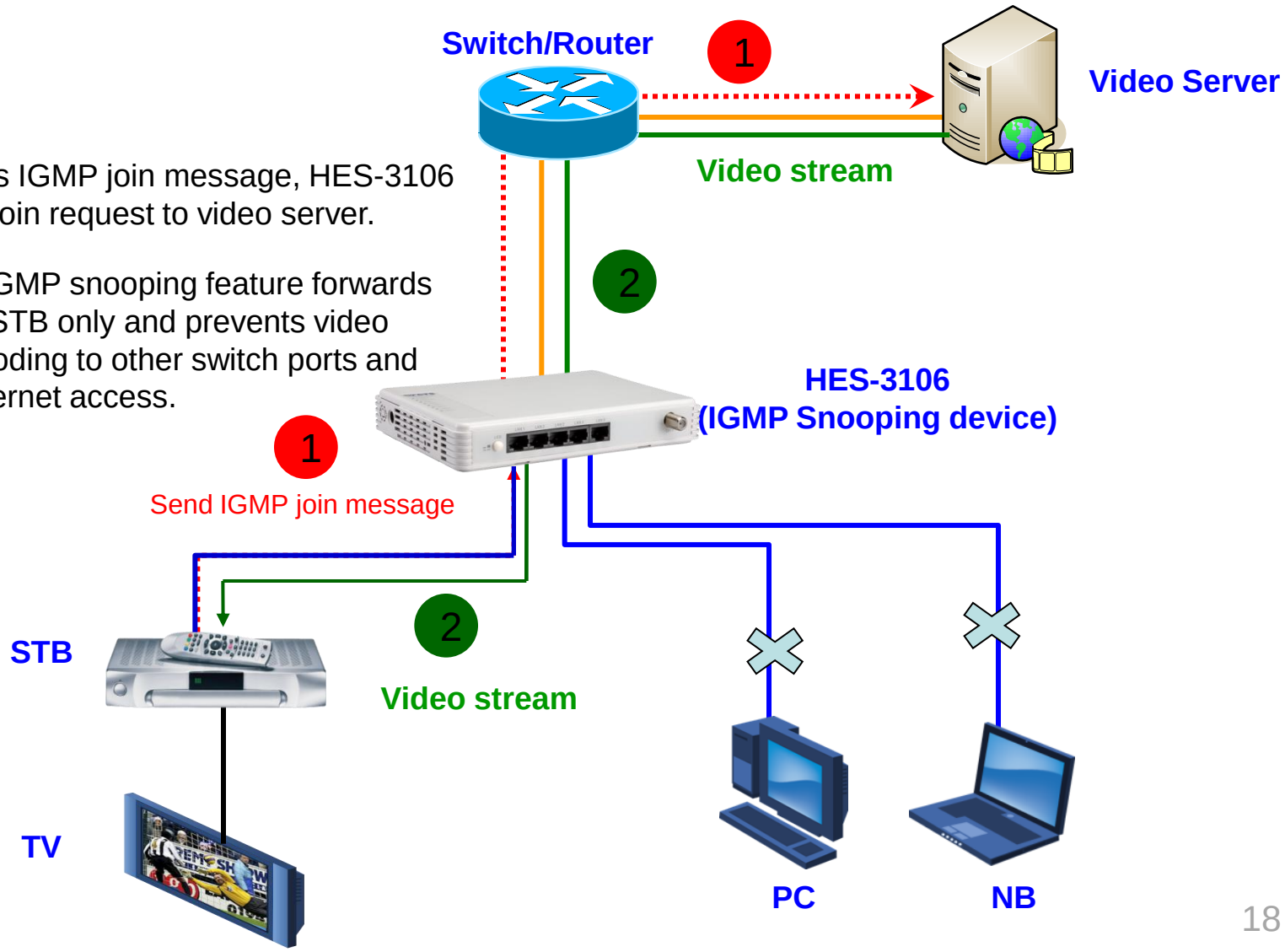
- DHCP Vendor ID **can be defined by the user** (service providers, soho users, etc.)

- Only Firmware and Configuration file that have the **same DHCP Vendor ID defined in "dhcpd.cong" are downloaded**.

IGMP Snooping for IPTV STB

1. When STB sends IGMP join message, HES-3106 will forward the join request to video server.

2. The HES-3106 IGMP snooping feature forwards video stream to STB only and prevents video stream from flooding to other switch ports and interrupts the internet access.



100/1000Mbps Dual Rate for Fiber Uplink

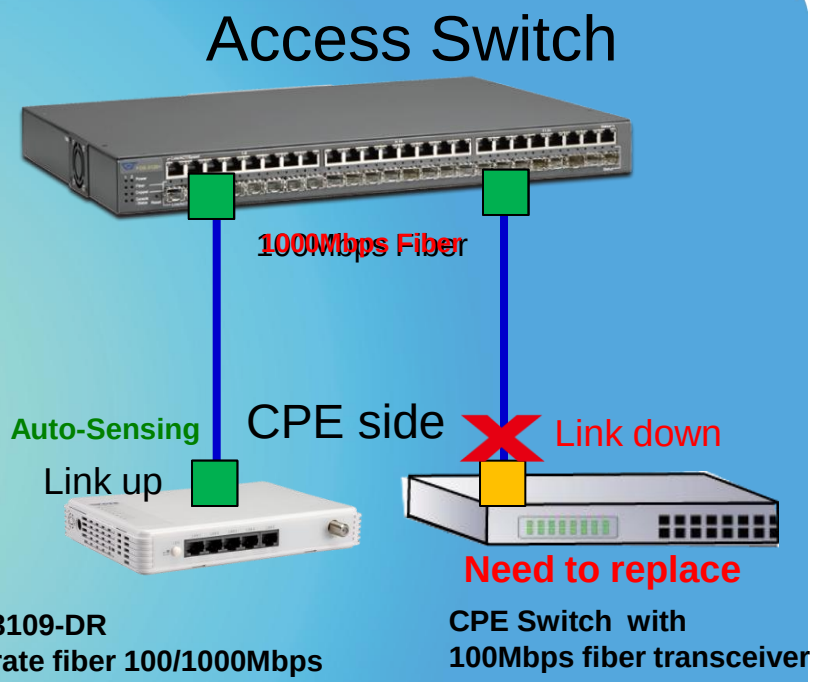
Normally, the Fiber optical Access Switches support 100Mbps or 1000Mbps speed on SFP slot. However, not all CPE switches can support both 100Mbps and 1000Mbps on uplink Fiber port.

Under 100Mbps F/O network stage

F/O network upgrades from 100Mbps to 1000Mbps

CTS HES-3106-DR with Fiber auto-sensing function
NO NEED to do any change or configuration

Other CPE switches that do not support Dual Rate
NEED to be replaced for 1000Mbps fiber uplink.

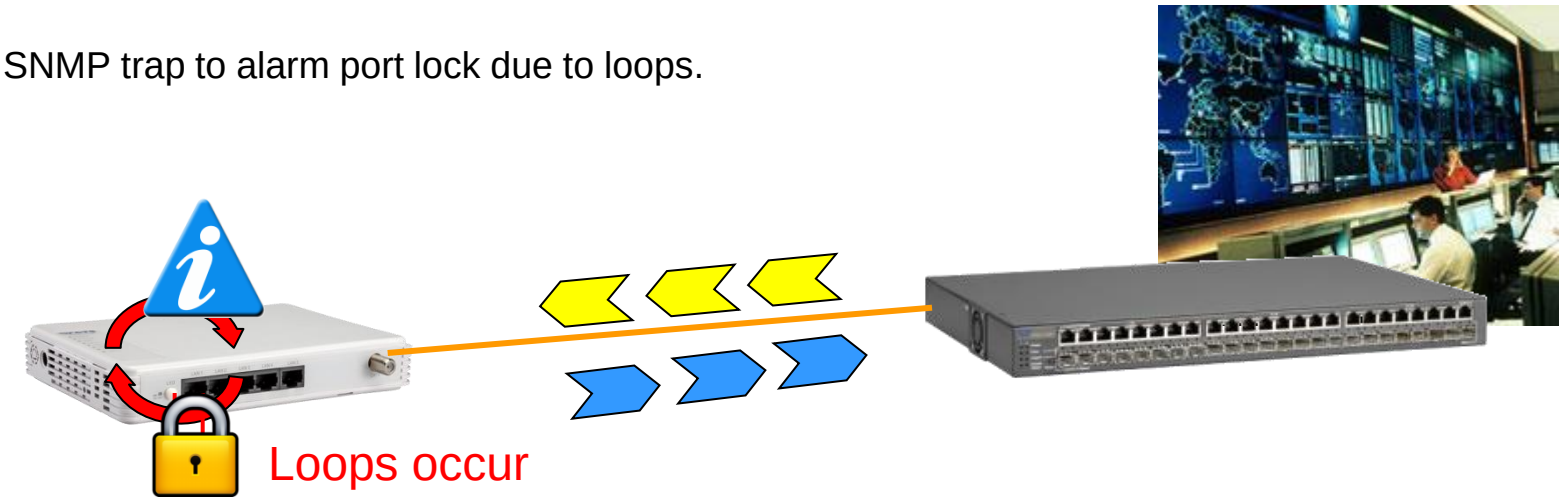


Advantages:
1.Auto-sensing selection to reduce manual configuration change.
2.Reducing future CPE upgrade and installation cost to Gigabit speed.
3.Dual rate fiber transceiver could be fixed or SFP fiber.

Loop Detection for LAN Port

When loops occur, it will cause broadcast storm and affect the performance of layer two Access switch. To avoid this, loop detection can be enabled on LAN port of the CPE switch. When CPE switch detects the loop, it will lock the port which receives the loop packet immediately and send out SNMP trap to inform network administrator.

1. Loop state occurs due to human error or incorrect cable connection.
2. The switch in loop state sends out broadcast messages that cause broadcast storm.
3. When enabling loop detection on LAN port, CPE switch will lock the loop port.
4. Send out SNMP trap to alarm port lock due to loops.



LED Indication Control

Before

Advantages:

1. Reduce the Light pollution in mid night
2. Easy to switch on/off LED indication.

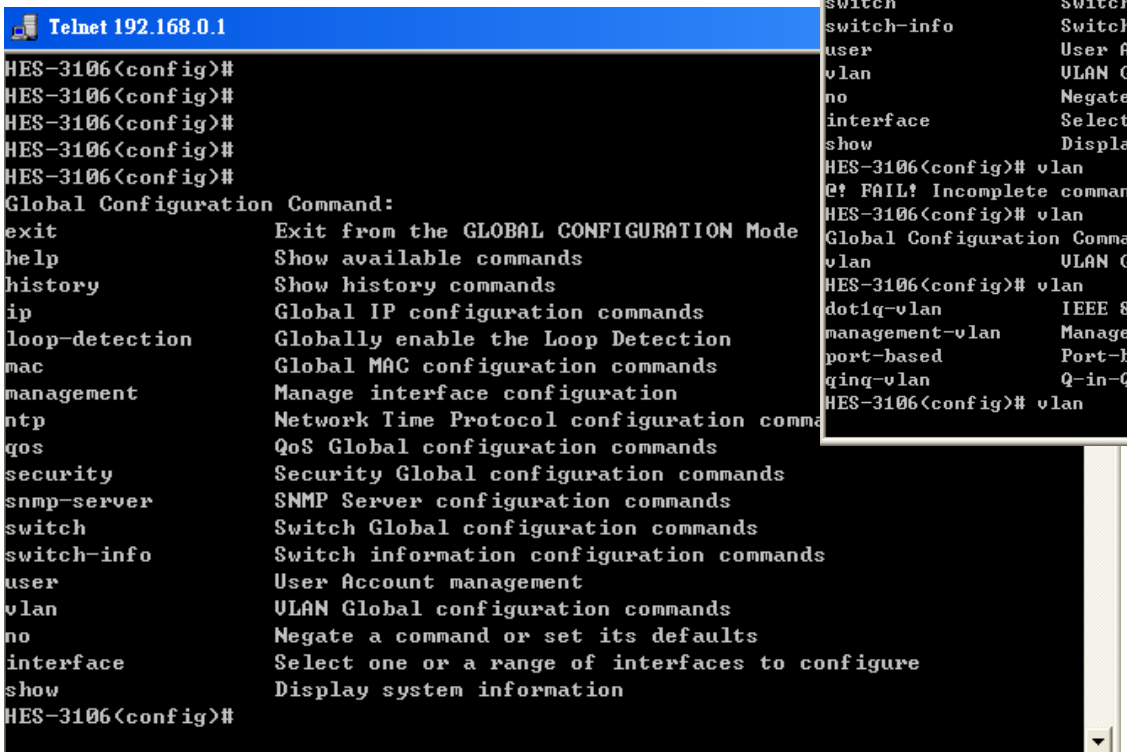
Power and Port LEDs light and flash continually to indicate normal networking operation.

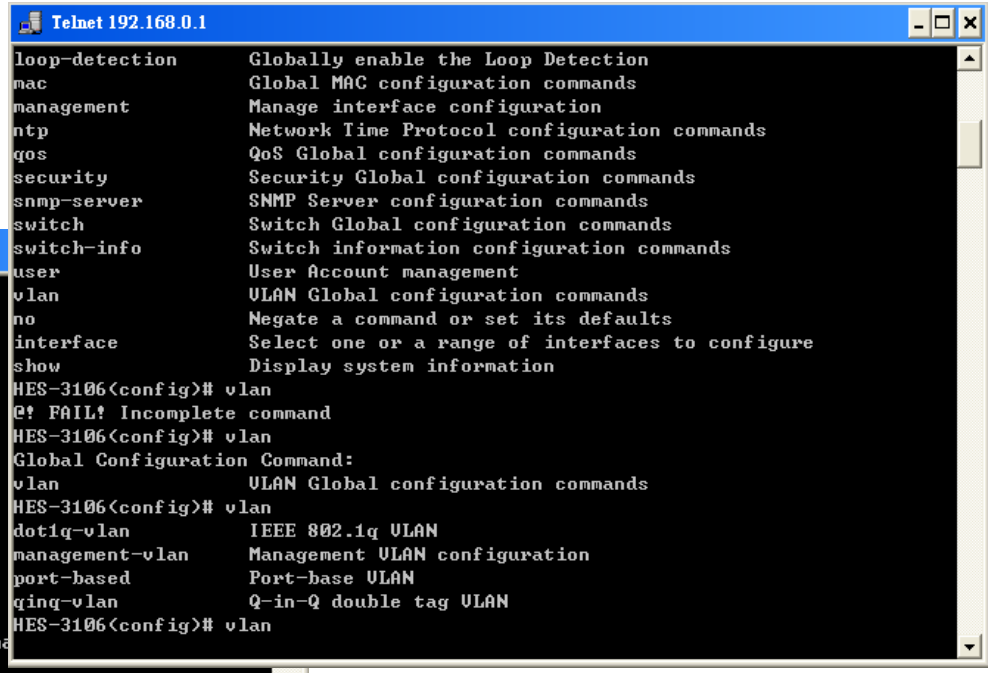
After

Only Power LED lights steadily to indicate normal networking operation.

CLI with Clear Text Configuration File

Public Cisco-like CLI interface allows network administrators to quickly setup CPE switch with less learning efforts.


Telnet 192.168.0.1
HES-3106(config)#
HES-3106(config)#
HES-3106(config)#
HES-3106(config)#
HES-3106(config)#
Global Configuration Command:
exit Exit from the GLOBAL CONFIGURATION Mode
help Show available commands
history Show history commands
ip Global IP configuration commands
loop-detection Globally enable the Loop Detection
mac Global MAC configuration commands
management Manage interface configuration
ntp Network Time Protocol configuration comma
qos QoS Global configuration commands
security Security Global configuration commands
snmp-server SNMP Server configuration commands
switch Switch Global configuration commands
switch-info Switch information configuration commands
user User Account management
vlan VLAN Global configuration commands
no Negate a command or set its defaults
interface Select one or a range of interfaces to configure
show Display system information
HES-3106(config)#


Telnet 192.168.0.1
loop-detection Globally enable the Loop Detection
mac Global MAC configuration commands
management Manage interface configuration
ntp Network Time Protocol configuration commands
qos QoS Global configuration commands
security Security Global configuration commands
snmp-server SNMP Server configuration commands
switch Switch Global configuration commands
switch-info Switch information configuration commands
user User Account management
vlan VLAN Global configuration commands
no Negate a command or set its defaults
interface Select one or a range of interfaces to configure
show Display system information
HES-3106(config)# vlan
@! FAIL! Incomplete command
HES-3106(config)# vlan
Global Configuration Command:
vlan VLAN Global configuration commands
HES-3106(config)# vlan
dot1q-vlan IEEE 802.1q VLAN
management-vlan Management VLAN configuration
port-based Port-base VLAN
qinq-vlan Q-in-Q double tag VLAN
HES-3106(config)# vlan

Clear Text CLI Configuration File

Clear text configuration file can be quite powerful. Piling multiple commands together, parsing feedback, etc.
The clear text configuration file easily lists CLI commands to integrate with scripting and other programmatic interfaces.

CTS Devices with Clear Text CLI Configuration File

```
# VERSION 5024 6000 0.99.AW MAC 00:06:19:01:23:45
configure
ip address dhcp
ip igmp snooping
no loop-detection
no snmp-server community public
no snmp-server community admin
snmp-server community public
description Default_Account
level rw
exit
snmp-server community admin
description Default_Account
level admin
exit
snmp-server trap-type all
no vlan dot1q-vlan 1
vlan dot1q-vlan 60
name management
exit
```

Simple & easy to read

Other Devices with XML Text Based Configuration File

```
<device xsi:type="axl:XIPPhone" ctiid="1566023366">
<deviceProtocol>SIP</deviceProtocol>
<sshUserId>cisco</sshUserId>
<sshPassword>cisco</sshPassword>
<devicePool>
<dateTimeSetting>
<dateTemplate>D-M-YA</dateTemplate>
<timeZone>UTC Standard/Daylight Time</timeZone>
</dateTimeSetting>
<callManagerGroup>
<members>
<member priority="0">
<callManager>
<ports>
<ethernetPhonePort>2000</ethernetPhonePort>
<sipPort>5060</sipPort>
<securedSipPort>5061</securedSipPort>
</ports>
<processNodeName>10.10.1.1</processNodeName>
</callManager>
</member>
</members>
</callManagerGroup>
```

Full of less informative parameters & symbols

RF Module for Coaxial CATV

CATV Headend Transmitter

Optical with CATV signal

Built-in CATV RF receiver allows HES-3106 to receive converted optical signals from the headend device.

IPTV video server
IGMP Router

Ethernet Optical with IPTV Video stream

HES-3106 with IGMP snooping function can receive multicast packets sent from IPTV video server or IGMP Router.

Ethernet
RJ-45 Copper

STB IPTV

Broadcast TV
Coaxial Cable

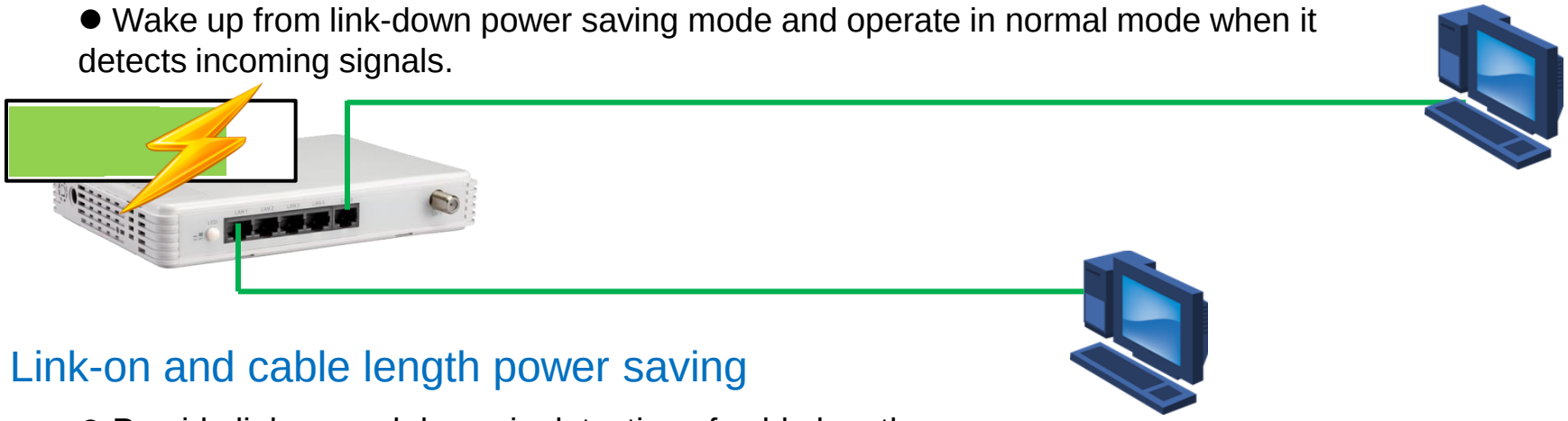
TV

CATV

Green Ethernet

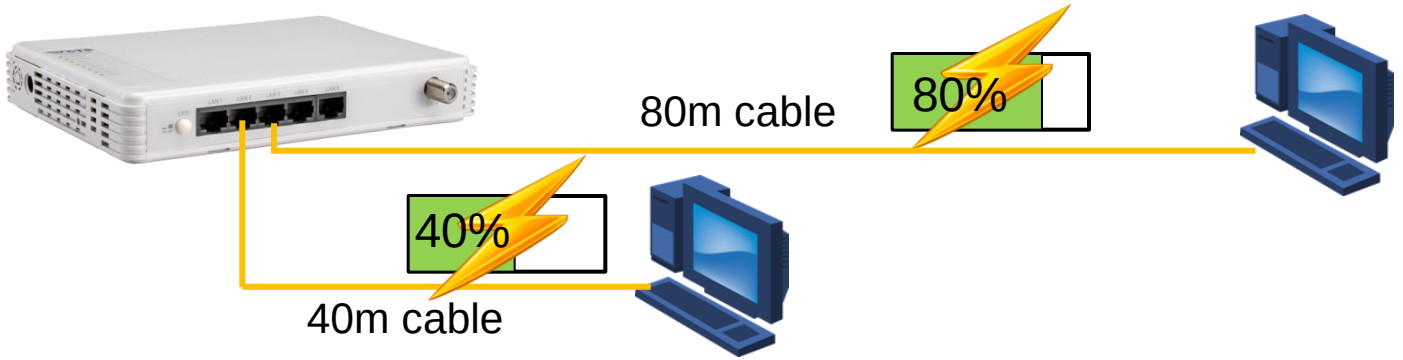
Link Down Power saving

- Link-down power saving on a per-port basis
- Cut power consumption when the network cable is disconnected
- Wake up from link-down power saving mode and operate in normal mode when it detects incoming signals.



Link-on and cable length power saving

- Provide link-on and dynamic detection of cable length
- Provide dynamic adjustment of power required for the detected cable length
- This feature provides high performance with minimum power consumption.



HES Series Comparison

Product / Spec.	HES-3109-DR	HES-3106-DR
Interface	8-Port 10/100/1000TP 1-Port 1000SFP or 100/1000 F/O	5-Port 10/100/1000TP 1-Port 1000SFP or 100/1000 F/O
Dual Rate	V	V
CATV RF	V	V
Battery Charging	V	X
Cable Tray	V	V
Smart Lighting Control	V	V
Jumbo Frame	V	V
Switching	Store and Forward	Store and Forward
MAC Address Table	8K	2K
Dimension (Device)	228 x 148 x 33 (W x D x H)	180 x 130 x 30 (W x D x H)
Weight (Device)	1.6kg	0.85kg

Thanks For Your Attention

CTS, the right business solution for you.